

# Novel, Vacuum-Regenerable Trace Contaminant Control System for Advanced Spacesuit Applications, Phase I

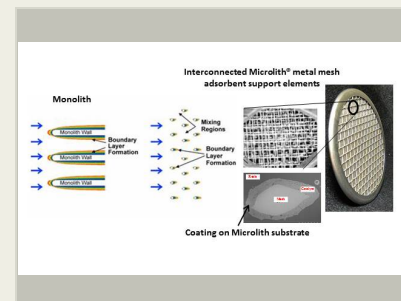
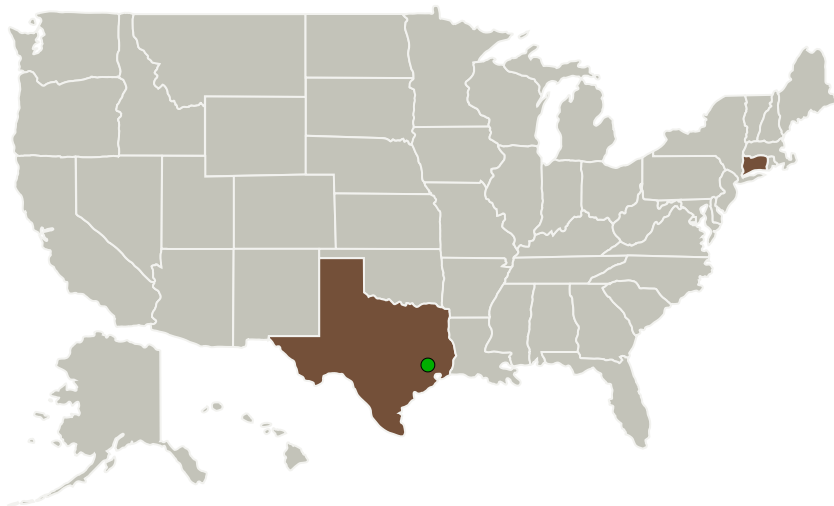
Completed Technology Project (2016 - 2016)



## Project Introduction

Trace contaminants that are introduced into the ventilation loop of a spacesuit (primarily ammonia and formaldehyde) via metabolic processes, off-gassing of spacesuit materials, and by-products of the amine used in the rapid cycle amine (RCA) system are typically removed using activated charcoal. Although effective, the downside of using these materials is a bulky system with low regeneration capability, a reliance on consumables, significant power consumption, and consequently high associated life cycle operating cost. Precision Combustion, Inc. (PCI) proposes a new material paradigm for the Trace Contaminant Control System (TCCS) based upon its novel adsorbent nanomaterials that have high surface area and can be designed to achieve uniquely-targeted sorbent properties including minimizing competitive sorption with water and CO<sub>2</sub> and vacuum regeneration without heating. PCI will apply the developed nanomaterials on ultra-short channel length, lightweight Microlith<sup>®</sup> support substrates to permit practical implementation of the sorbent for a real-time vacuum swing regenerable TCCS. Successful implementation of PCI's modular strategy will increase flexibility of equipment while reducing total volume and material inventory required for TCCS and atmosphere revitalization applications. Additional benefits include humidity tolerance, as well as reduced volume, weight, pressure drop, energy consumption, and reliance on consumables.

## Primary U.S. Work Locations and Key Partners



Novel, Vacuum-Regenerable Trace Contaminant Control System for Advanced Spacesuit Applications, Phase I

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Organizations Performing Work	Role	Type	Location
Precision Combustion, Inc.	Lead Organization	Industry	North Haven, Connecticut
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Connecticut	Texas

## Project Transitions

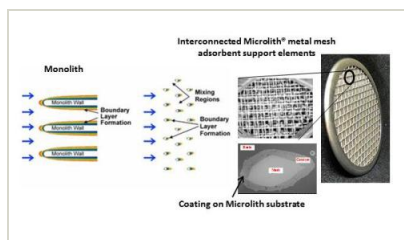
▶ **June 2016:** Project Start

✓ **December 2016:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140261>)

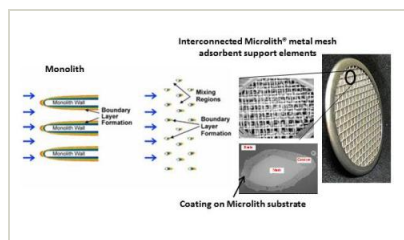
## Images



### Briefing Chart Image

Novel, Vacuum-Regenerable Trace Contaminant Control System for Advanced Spacesuit Applications, Phase I

(<https://techport.nasa.gov/image/128292>)



### Final Summary Chart Image

Novel, Vacuum-Regenerable Trace Contaminant Control System for Advanced Spacesuit Applications, Phase I Project Image

(<https://techport.nasa.gov/image/129845>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Precision Combustion, Inc.

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

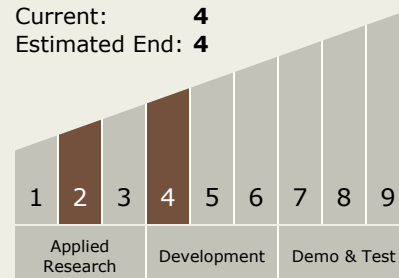
Carlos Torrez

### Principal Investigator:

Christian Junaedi

## Technology Maturity (TRL)

Start: 2  
Current: 4  
Estimated End: 4



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## Technology Areas

### Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - └ TX06.2 Extravehicular Activity Systems
    - └ TX06.2.2 Portable Life Support System

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System